

What is claimed is:

1. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles and scanning the primary charged beams on a sample, said device comprising:

a transmitted signal conversion member for emitting secondary charged particles by collisions of charged particles transmitted through the sample; and

an opening of a size, formed in said transmitted signal conversion member, through which the charged particles scattered within and transmitted through the sample can pass.

2. A charged particle beam device as claimed in Claim 1, further comprising a detector for detecting the secondary charged particles converted by said transmitted signal conversion member.

3. A charged particle beam device as claimed in Claim 1, wherein transmitted signal particle detection means is disposed at a position to detect transmitted signal particles having passed through said opening of said transmitted signal conversion member.

4. A charged particle beam device as claimed in Claim 3, wherein an aperture for obstructing part of the transmitted signal particles reaching said transmitted signal particle detection means is disposed between said transmitted signal particle detection means and said transmitted signal conversion member.

5. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles

and scanning the primary charged beams on a sample, said device comprising:

a scintillator for emitting light by collisions of the charged particles transmitted through the sample;

means for converting the light emitted from said scintillator into an electric signal at a position to detect the light; and

an opening of a size, formed in said scintillator, through which the charged particles transmitted through the sample without being scattered therein can pass.

6. A charged particle beam device as claimed in Claim 5, wherein transmitted signal particle detection means is disposed at a position to detect transmitted signal particles having passed through said opening of said scintillator.

7. A charged particle beam device as claimed in Claim 6, wherein an aperture for obstructing part of the transmitted signal particles reaching said transmitted signal particle detection means is disposed between said transmitted signal particle detection means and said scintillator.

8. A charged particle beam device as claimed in Claim 1, comprising an objective lens for focusing the primary charged particle beams, wherein said objective lens is configured to leak a focusing magnetic field toward the sample.

9. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles and scanning the primary charged beams on a sample, said device comprising:

a transmitted signal conversion member for emitting secondary charged particles by collisions of charged particles transmitted through the sample; and

a detector for attracting and detecting the secondary charged particles emitted from said transmitted signal conversion member, wherein said objective lens for focusing the primary charged particle beams is configured to leak a focusing magnetic field toward the sample.

10. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles and scanning the primary charged beams on a sample, said device comprising:

a transmitted signal conversion member for emitting secondary charged particles by collisions of charged particles transmitted through the sample;

an opening of a size, formed in said transmitted signal conversion member, through which the transmitted charged particles can pass; and

a power supply for applying zero voltage or a positive voltage to said opening.

11. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles and scanning the primary charged beams on a sample, said device comprising:

a transmitted signal conversion member for emitting secondary charged particles by collisions of charged particles transmitted

through the sample, wherein said transmitted signal conversion member includes two electrodes having openings for the transmitted charged particle beams to pass through, and

a detector for detecting the secondary charged particles between said two electrodes.

12. A charged particle beam device as claimed in Claim 11, wherein said two electrodes emit the secondary charged particles by collisions of the transmitted charged particles between said two electrodes.

13. A charged particle beam device as claimed in Claim 12, wherein said two electrodes are configured such that the charged particle beams collide a plurality of times against said two electrodes.

14. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles and scanning the primary charged beams on a sample, said device comprising:

a dark field signal detector for detecting dark field signal particles transmitted through the sample;

a bright field signal detector for detecting bright field signal particles transmitted through the sample;

an aperture placed between said dark field signal detector and said bright field signal detector; and

a power supply for applying a positive voltage to said aperture.

15. A charged particle beam device as claimed in Claim 14, wherein said bright field signal detector includes a transmitted signal conversion member for emitting secondary charged particles by collisions of the dark field signal particles transmitted through the sample.

16. A charged particle beam device as claimed in Claim 14, wherein said aperture is formed in a double structure.

17. A charged particle beam device having a source of charged particles, and a charged particle optical system for focusing primary charged particle beams emitted from said source of charged particles and scanning the primary charged beams on a sample, said device comprising:

a dark field signal detector for detecting dark field signal particles transmitted through the sample, wherein said dark field signal detector includes a transmitted signal conversion member for emitting secondary charged particles by collisions of the dark field signal particles.

18. A charged particle beam device as claimed in Claim 17, comprising a bright field signal detector for detecting bright field signal particles having passed through said transmitted signal conversion member.

19. A charged particle beam device as claimed in Claim 17, wherein said transmitted signal conversion member includes an opening, and a Faraday cup provided in said opening.

20. A charged particle beam device as claimed in Claim 17, comprising a power supply for applying a positive voltage to said Faraday cup.